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Form 1449 (Modified)	Atty Docket No. SRI1P028/4431-2	Application No.: 09/779,203
Information Disclosure Statement By Applicant	Applicant: Petrine, et al.	
(Use Several Sheets if Necessary)	Filing Date 02/07/01	Group 2858

U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub- class	Filing Date
✓ KBA	A	6,048,622	04/11/00	Hagood, et al.			02/09/99
	B	5,915,377	06/29/99	Coffee			01/24/97
	C	5,902,836	05/11/99	Bennet, et al.			08/23/95
	D	5,835,453	11/10/98	Wynne, et al.			05/05/97
✓ KBA	E	5,642,015	06/24/97	Whitehead, et al.			05/01/95
✓ KBA	F	5,430,565	07/04/95	Yamanouchi, et al.			06/02/93
✓ KBA	G	5,254,296	10/19/93	Pechman			11/13/91
	H	5,250,784	10/05/93	Miller, et al.			10/24/91
	I	5,229,979	07/20/93	Scheinbeim, et al.			12/13/91
✓ KBA	J	5,024,872	06/18/91	Wilson, et al.			08/13/87
	K	4,969,197	11/06/90	Takaya			02/21/89
	L	4,885,783	12/05/89	Whitehead, et al.			04/10/87
✓ KBA	M	4,843,275	06/27/89	Radice			01/19/88
	N	4,518,555	05/21/85	Ravinet, et al.			06/14/83
	O	4,401,911	08/30/83	Ravinet, et al.			03/02/81
	P	4,400,634	08/23/83	Micheron			12/09/80
	Q	4,384,994	05/24/83	Lemmon, et al.			05/13/81
	R	3,403,234	09/24/68	Barnes, Jr.			09/11/64

Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub- class	Translation	
							Yes	No
✓ KBA	S	WO 01/06575	01/25/01	PCT			X	
✓ KBA	T	WO 98/35529	08/13/98	PCT			X	
	U	WO 95/08905	03/30/95	PCT			X	

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	V	Ajumi, Cheryl, "Pressure Sensors Strive to Stay on Top, New Silicon Micromachining Techniques and Designs Promise Higher Performance", <i>Electronic Design - Advanced Technology Series</i> , October 5, 1994, pp. 67-74
	W	Anderson, R. A., "Mechanical Stress in a Dielectric Solid From a Uniform Electric Field", <i>The American Physical Society</i> , 1986, pp. 1302-1307
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	X	Aramaki, S., S. Kaneko, K. Arai, Y. Takahashi, H. Adachi, and K. Yamagisawa. 1995. "Tube Type Micro Manipulator Using Shape Memory Alloy (SMA)," <i>Proceedings of the IEEE Sixth International Symposium on Micro Machine and Human Science</i> , Nagoya, Japan, pp. 115-120.
	Y	Ashley, S., "Smart Skis and Other Adaptive Structures", <i>Mechanical Engineering</i> , November 1995, pp. 77-81
✓ KBA	Z	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 1, No. 1, June 1999.
✓ KBA	A1	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 1, No. 2, December 1999.
✓ KBA	A2	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 2, No. 1, July 2000.
	A3	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 2, No. 2, December 2000.
✓ KBA	A4	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 3, No. 1, June 2001.
✓ KBA	A5	Bar-Cohen, Yoseph, JPL, <i>WorldWide Electroactive Polymer Actuators Webhub</i> webpages 1-7, http://ndeez-jpl.nasa.gov/nasa-nde/commas/eap/EAP-web.htm , downloaded July 23, 2001.
	A6	Baughman, R., L. Shacklette, R. Elsenbaumer, E. Plichta, and C. Becht "Conducting Polymer Electromechanical Actuators," <i>Conjugated Polymeric Materials: Opportunities in Electronics, Optoelectronics and Molecular Electronics</i> , eds. J.L. Bredas and R.R. Chance, Kluwer Academic Publishers, The Netherlands, pp. 559-582, 1990
✓ KBA	A7	Baughman, R.H., L.W. Shacklette, and R.L. Elsenbaumer, E.J. Plichta, and C. Becht, "Micro electromechanical actuators based on conducting polymers", in <i>Molecular Electronics, Materials and Methods</i> , P.I. Lazarev (ed.), Kluwer Academic Publishers, pp. 267-289 (1991)
	A8	Bharti, V., Y. Ye, T.-B. Xu and Q. M. Zhang, "Correlation Between Large Electrostrictive Strain and Relaxor Behavior with Structural Changes Induced in P(VDF-TrFE) Copolymer by electron Irradiation," <i>Mat. Res. Soc. Symp. Proc.</i> Vol 541, pp. 653-659 (1999).
	A9	Bharti, V., Z.-Y. Cheng, S. Gross, T.-B. Xu, and Q. M. Zhang, "High electrostrictive strain under high mechanical stress in electron-irradiated poly(vinylidene fluoride-trifluoroethylene) copolymer," <i>Appl. Phys. Lett.</i> Vol. 75, 2653-2655 (October 25, 1999).
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	B1	Bharti, V., H. S. Xu, G. Shanthi, and Q. M. Zhang, "Polarization and Structural Properties of High Energy Electron Irradiated Poly(vinylidene fluoride-trifluoroethylene) Copolymer Films," to be published in J. Appl. Phys. (2000).
	B2	Bharti, V., X.-Z. Zhao, Q. M. Zhang, T. Romotowski, F. Tito, and R. Ting, "Ultrahigh Field Induced Strain And Polarization Response In Electron Irradiated Poly(Vinylidene Fluoride-Trifluoroethylene) Copolymer," <i>Mat. Res. Innovat.</i> Vol 2, 57-63 (1998).
✓ KDP	B3	Bobbio, S., M. Kellam, B. Dudley, S. Goodwin Johansson, S. Jones, J. Jacobson, F. Tranjan, and T. DuBois, "Integrated Force Arrays," in Proc. IEEE Micro ElectroMechanical Systems Workshop, Fort Lauderdale, Florida February 1993.
	B4	Bohm, K., and S. Krause, "An Electrorheological Fluid and Siloxane Gel Based Electromechanical Actuator: Working Toward an Artificial Muscle," to be published in <i>J. Polymer Sci., Part B: Polymer Phys.</i> (2000)
	B5	Brock, D. L., "Review of Artificial Muscle based on Contractile Polymers," MIT Artificial Intelligence Laboratory, A.I. Memo No. 1330, Nov. 1991.
	B6	Caldwell, D., G. Madrano-Cerda, and M. Goodwin, "Characteristics and Adaptive Control of Pneumatic Muscle Actuators for a Robotic Elbow," Proc. IEEE Int. Conference on Robotics and Automation, San Diego, California (8-13 May 1994).
	B7	Calvert, P. and Z. Liu, "Electrically stimulated bilayer hydrogels as muscles," Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices, March 1-2, 1999, Newport Beach, California, USA, pp. 236-241.
	B8	Cheng, Z.-Y., H. S. Xu, J. Su, Q. M. Zhang, P.-C. Wang, and A. G. MacDiarmid, "High performance of all-polymer electrostrictive systems," Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices, March 1-2, 1999, Newport Beach, California, USA, pp. 140-148.
	B9	Cheng, Z.-Y., T.-B. Xu, V. Bharti, S. Wang, and Q. M. Zhang, "Transverse Strain Responses In The Electrostrictive Poly(Vinylidene Fluoride-Trifluoroethylene) Copolymer," <i>Appl. Phys. Lett.</i> Vol 74, No. 13, pp. 1901-1903, March 29, 1999.
	B10	Chiarelli, P., A. Della Santa, D. DeRossi, and A. Mazzoldi, 1995. "Actuation Properties of Electrochemically Driven Polypyrrole Free-standing Films," <i>Journal of Intelligent Material Systems and Structures</i> , Vol. 6, pp. 32-37, January 1995
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	C1	De Rossi, D., and P. Chiarelli. 1994. "Biomimetic Macromolecular Actuators," <i>Macro-Ion Characterization, American Chemical Society Symposium Series</i> , Vol. 548, Ch. 40, pp. 517-530.
✓ KPA	C2	Dowling, K., <i>Beyond Faraday-Non Traditional Actuation</i> , available on the World Wide Web at http://www.fra.ri.cmu.edu/~nivesk/OTB/beyond-faraday/beyondfaraday.html , 9 pages, 1994
	C3	Egawa, S. and T. Higuchi, "Multi-Layered Electrostatic Film Actuator," <i>Proc. IEEE Micro Electro Mechanical Systems</i> , Napa Valley, California, pp. 166-171 (February 11-14, 1990).
	C4	Elhami, K., and B. Gaudier-Manuel, "Electrostriction Of The Copolymer Of Vinylidene-Fluoride And Trifluoroethylene," <i>J. Appl. Phys.</i> Vol. 77 (8), 3987-3990, April 15, 1995.
	C5	Flynn, Anita M., L.S. Tavrow, S.F. Bart, R.A. Brooks, D.J. Ehrlich, K.R. Udayakumar, and I.E. Cross. 1992. "Piezoelectric Micromotors for Microrobots," <i>IEEE Journal of Microelectromechanical Systems</i> , Vol. 1, No. 1, pp. 44-51 (March 1992); also published as MIT AI Laboratory Memo 1269, Massachusetts Institute of Technology (February 1991).
	C6	Full, R. J. and K. Meijer, "Artificial Muscles Versus Natural Actuators From Frog To Flies," <i>Proceedings of the 7th SPIE Symposium on Smart Structures and Materials-Electroactive Polymers and Devices (EAPAD) Conference</i> , March 6-8, 2000, Newport Beach, California, USA, pp. 2-9.
✓ KPA	C7	Furuhata, T., T. Hirano, and H. Fujita, "Array-Driven Ultrasonic Microactuators," <i>Solid State Sensors and Actuators</i> , 1991, Digest of Tech. Papers, Transducers, pp. 1056-1059
	C8	Furukawa, T., and N. Sato, "Electrostriction as the Origin of Piezoelectricity in Ferroelectric Polymers," <i>Japanese J. Applied Physics</i> , Vol. 29, No. 4, pp. 675-680 (April 1990).
	C9	Gilbertson, R.G., and J.D. Busch. 1994. "Survey of Micro-Actuator Technologies for Future Spacecraft Missions," presented at the conference entitled "Practical Robotic Interstellar Flight: Are We Ready?" New York University and The United Nations, New York. (August 29 and September 1, 1994); also published on the World Wide Web at http://monofline.com/nanosci/microtech/mems/ten-actuators/gilbertson.html .
	C10	Goldberg, Lee, "Adaptive Filtering Developments Extend Noise Cancellation Applications," <i>Electronic Design</i> , February 6, 1995, pages 34 and 36
	C11	M. Greene and J. A. Willett, and Kombluh, R., "Robotic systems," in ONR Report 32198-2, Ocean Engineering and Marine Systems 1997 Program (Dec. 1997)
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✓ KPA	7/9/03	

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Other Documents

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	D2	Heydt, R., R. Kornbluh, R. Petrine, and B. Mason, "Design and Performance of an Electrostrictive Polymer Film Acoustic Actuator", <i>Journal of Sound and Vibration</i> (1998)215(2), 297-311.
	D3	Hirano, M., K. Yamagisawa, H. Kuwano, and S. Nakano, "Microvalve with Ultra-low Leakage," Tenth Annual International Workshop on Micro Electromechanical Systems, Nagoya, Japan, <i>IEEE Proceedings</i> (January 26-30, 1997), pp. 323-326.
	D4	Hirose, S., Biologically Inspired Robots: Snake-like Locomotors and Manipulators, "Development of the ACM as a Manipulator", Oxford University Press, New York, 1993, pp.170-172.
	D5	Hunter, I., S. Lafontaine, J. Hollerbach, and P. Hunter, "Fast Reversible NITI Fibers for Use in MicroRobotics," <i>Proc. 1991 IEEE Micro Electro Mechanical Systems-MEMS '91</i> , Nara, Japan, pp.166-170.
	D6	Hunter, I.W., and S. Lafontaine, "A Comparison of Muscle with Artificial Actuators", <i>Technical Digest of the IEEE Solid-state Sensor and Actuator Workshop</i> , Hilton Head, South Carolina, June 22-25, 1992, pp.178-185.
	D7	Jacobsen, S., Price, R., Wood, J., Ryding, T., and Rafaelof, M., "A Design Overview of an Eccentric-Motion Electrostatic Microactuator (the Wobble Motor)", <i>Sensors and Actuators</i> , 20 (1989) pages 1-16
	D8	Kaneto, K., M. Kaneko, Y. Min, and A.G. MacDiarmid. 1995. "Artificial Muscles: Electromechanical Actuators Using Polyamine Films," <i>Synthetic Metals</i> 71, pp. 2211-2212, 1995
	D9	Kawamura, S., K. Minami, and M. Esashi, "Fundamental Research of Distributed Electrostatic Micro Actuator," <i>Technical Digest of the 11th Sensor Symposium</i> , pp. 27-30(1992).
	D10	Kondoh Y., and T. Ono. 1991. "Bimorph Type Actuators using Lead Zinc Niobate-based Ceramics," <i>Japanese Journal of Applied Physics</i> , Vol. 30, No. 9B, pp. 2260-2263, September 1991.
	D11	Kornbluh, R., R. Petrine, R. Heydt, and Q. Pei, "Acoustic Actuators Based on the Field-Activated Deformation of Dielectric Elastomers," (2000)
✓ KBA	D12	Kornbluh, R., G. Andeen, and J. Eckerle, "Artificial Muscle: The Next Generation of Robotic Actuators," presented at the Fourth World Conference on Robotics Research, SME Paper M591-331, Pittsburgh, PA, September 17-19, 1991.
Examiner		Date Considered 7/9/02

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Other Documents

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✓ KBA	E1	Kornbluh, R., R. Petrine, J. Joseph, "Elastomeric Dielectric Artificial Muscle Actuators for Small Robots," <i>Proceedings of the Third IASTED International Conference on Robotics and Manufacturing</i> , June 14-16, 1995, Cancun, Mexico.
✓ KBA	E2	Kornbluh, R., Petrine, R., Eckerle, J., Joseph, J., "Electrostrictive Polymer Artificial Muscle Actuators", IEEE International Conference on Robotics and Automation, Leuven, Belgium, 1998
✓ KBA	E3	Kornbluh, R., R. Petrine, Jose Joseph, Richard Heydt, Qibing Pei, Saiki Chiba, 1999. "High-Field Electrostriction Of Elastomeric Polymer Dielectrics For Actuation", <i>Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices</i> , March 1-2, 1999, Newport Beach, California, USA, pp. 149-161.
✓ KBA	E4	Kornbluh, R. D and R. E. Petrine, "Dexterous Multiarticulated Manipulator with Electrostrictive Polymer Artificial Muscle," ITAD-7247-QR-96-175, SRI Project Number 7247, Prepared for: Office of Naval Research, November 1996
✓ KBA	E5	Kornbluh, R., R. Petrine, Q. Pei, S. Oh, and J. Joseph, 2000. "Ultrahigh Strain Response of Field-Actuated Elastomeric Polymers," <i>Proceedings of the 7th SPIE Symposium on Smart Structures and Materials-Electroactive Polymers and Devices (EAPAD) Conference</i> , March 6-8, 2000, Newport Beach, California, USA, pp. 51-64.
	E6	Kornbluh, R., Petrine, R., Joseph, J., Pei, Q. and Chiba, S., "Ultra-High Strain Response of Elastomeric Polymer Dielectrics", <i>Proc. Materials Res. Soc.</i> , Fall meeting, Boston, MA, pages 1-12, December 1999
	E7	Ktech's PVDF Sensors, http://www.ktech.com/pvdf.htm , 06/06/2001, pp. 1-5.
✓ KBA	E8	Lang, J. M. Schlect, and R. Howe, "Electric Micromotors: Electromechanical Characteristics," <i>Proc. IEEE Micro Robots and Teleoperators Workshop</i> , Hyannis, Massachusetts (November 9-11, 1987).
	E9	Liu, Y., T. Zeng, Y.X. Wang, H. Yu, and R. Claus, "Self-Assembled Flexible Electrodes on Electroactive Polymer Actuators," <i>Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices</i> , March 1-2, 1999, Newport Beach, California, USA, pp. 284-288.
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	F2	Lawless, W. and R. Arenz, "Miniature Solid-state Gas Compressor," <i>Rev. Sci. Instrum.</i> , 58(8), pp.1487-1493, August 1987
	F3	Martin, J. and R. Anderson, 1999. "Electrostriction In Field-Structured Composites: Basis For A Fast Artificial Muscle?", <i>Journal of Chemical Physics</i> , Vol. 111, no. 9, pp.4273-4280, September 1, 1999
	F4	Measurements Specialties, Inc. - Piezo Home. http://www.msusa.com/piezo/index.htm , 06/06/2001.
	F5	T. B. Nguyen, C. K. DeBolt, Shasiri, S. V., and A. Mann, "Advanced Robotic Search," in ONR Ocean, Atmosphere, and Space Fiscal Year 1999 Annual Reports (Dec. 1999)
	F6	Nguyen, T., J. A. Willott and Kornbluh, R., "Robotic systems," in ONR Ocean, Atmosphere, and Space Fiscal Year 1998 Annual Reports (Dec. 1998)
	F7	Nguyen, T., Green, M., and Kornbluh, R., "Robotic Systems," in ONR Ocean, Atmosphere, and Space Fiscal Year 1999 Annual Reports (Dec. 1999)
	F8	Ohara, K., M. Hennecke, and J. Fahrenmann, "Electrostriction of polymethylmethacrylates," <i>Colloid & Polymer Sci.</i> Vol 280, 164-168 (1982).
	F9	Olsson, A., O. Larsson, J. Holm, L. Lundblad, O. Ohnán, and G. Stemme. 1997. "Valve-less Diffuser Micropumps Fabricated using Thermoplastic Replication," <i>Proc. IEEE Micro Electro Mechanical Systems</i> , Nagoya, Japan, pp. 305-310 (January 26-30, 1997).
	F10	Olsson, A., G. Stemme, and B. Stemme, "The First Valve-less Diffuser Gas Pump," Tenth Annual International Workshop on Micro Electro-mechanical Systems, Nagoya, Japan, <i>IEEE Proceedings</i> (January 26-30, 1997), pp.102-113.
	F11	Otero, T.F., J. Rodriguez, E. Angulo and C. Santamaria, "Artificial Muscles from Bilayer Structures," <i>Synthetic Metals</i> , Vol. 55-57, pp. 3713-3717 (1993).
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	F13	Park, S.E., and T. Shrout, "Ultrahigh Strain and Piezoelectric Behavior in Relaxor Based Ferroelectric Single Crystals," <i>J Applied Physics</i> , Vol. 82, pp. 1804-1811, August 15, 1997
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✓ KBA	G2	Pei et al., "Improved Electroactive Polymers", U.S. Patent Application No. 09/619,847, filed July 20, 2000, 70 pages
✓ KBA	G3	R. Petrine and Kornbluh, R., and 1995. "Dexterous Multiarticulated Manipulator with Electrostrictive Polymer Artificial Muscle Actuator," EMU 95-023, SRI International, Menlo Park, California, April 28, 1995.
✓ KBA	G4	Petrine, R., R. Kornbluh, and Q. Pei. "Electroactive Polymer Transducers And Actuators", U.S. Patent Application No. 09/620,025, filed July 20, 2001, 58 pages.
✓ KBA	G5	Petrine, R. and Kornbluh, "Electroactive Polymer Devices", U.S. Patent Application No. 09/619,846, filed July 20, 2000, 67 pages
	G6	Petrine et al., "Electroactive Polymer Electrodes", U.S. Patent Application No. 09/619,843, filed July 20, 2000, 54 pages
	G7	Petrine et al., "Electroactive Polymer Fabrication", U.S. Patent Application No. 09/619,845, filed July 20, 2000, 55 pages
	G8	Petrine et al., "Electroactive Polymer Generators", U.S. Patent Application No. 09/619,848, filed July 20, 2000, 69 pages
✓ KBA	G9	Petrine, R., R. Kornbluh, and J. Joseph, "Electrostriction of Polymer Dielectrics with Compliant Electrodes as a Means of Actuation," <i>Sensors and Actuators A: Physical</i> , Vol. 64, 1998, pp. 77-85.
✓ KBA	G10	Petrine, R., R. Kornbluh, J. Joseph, and S. Chiba, "Electrostriction of Polymer Films for Microactuators," <i>Proc. IEEE Tenth Annual International Workshop on Micro Electro Mechanical Systems</i> , Nagoya, Japan, January 26-30, 1997, pp. 238-243.
✓ KBA	G11	Petrine, R., R. Kornbluh, and J. Eckerle. "Energy Efficient Electroactive Polymers and Electroactive Polymer Devices", U.S. Patent Application No. 09/779,373, filed February 7, 2001.
✓ KBA	G12	Petrine, R., and J. Joseph. <i>FY 1992 Final Report on Artificial Muscle for Small Robots</i> , ITAD-3393-FR-93-063, SRI International, Menlo Park, California, March 1993
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✓	H2	Petrine, R., R. Kornbluh, and J. Joseph. <i>FY 1994 Final Report on Artificial Muscle for Small Robots</i> , ITAD-5782-FR-95-050, SRI International, Menlo Park, California, 1995
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✓ KBA	H4	Petrine, R., R. Kornbluh, and J. Joseph. <i>FY 1996 Final Report on Artificial Muscle for Small Robots</i> , ITAD-7228-FR-97-058, SRI International, Menlo Park, California, 1997
✓ KBA	H5	Petrine, R., R. Kornbluh, and J. Joseph. <i>FY 1997 Final Report on Artificial Muscle for Small Robots</i> , ITAD-1612-FR-98-041, SRI International, Menlo Park, California, 1998
✓ KBA	H6	Petrine, R., R. Kornbluh, and J. Joseph. <i>FY 1998 Final Report on Artificial Muscle for Small Robots</i> , ITAD-3482-FR-99-36, SRI International, Menlo Park, California, 1999
✓ KBA	H7	Petrine, R., R. Kornbluh, and J. Joseph. <i>FY 1999 Final Report on Artificial Muscle for Small Robots</i> , ITAD-10162-FR-00-27, SRI International, Menlo Park, California, 2000
✓ KBA	H8	Petrine, R., R. Kornbluh, Q. Pei, and J. Joseph. "High-Speed Electrically Actuated Elastomers with Strain Greater Than 100%", <i>Science</i> , Reprint Series, Feb. 4 2000, Vol. 287, pp. 836-839.
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Form 1449 (Modified)	Atty Docket No. SRIIP028/4431-2	Application No.: 09/779,203
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Information Disclosure Statement By Applicant (Use Several Sheets if Necessary)	Applicant: Pelrine, et al. Filing Date 02/07/01 Group 2858
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Other Documents

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	I3	PiezoFlex™ PVDF Polymer Sensors, http://www.armor.com/piezo/pvdf.htm , 06/06/2001.
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Information Disclosure Statement By Applicant	Applicant: Petrine, et al.	Group 2858
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✓ <i>LB</i>	J3	Wax, S. G. and R. R. Sands, "Electroactive Polymer Actuators and Devices," Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices, March 1-2, 1999, Newport Beach, California, USA, pp. 2-10.
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